

# **RISK ASSESSMENT & JOB HAZARD ANALYSIS**

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# OBJECTIVES

This presentation will cover the key elements of an effective risk management program.

## **Risk Management Program**

Hazard identification and evaluation

Hazard analysis

Risk assessment

Risk reduction

Job hazard analysis

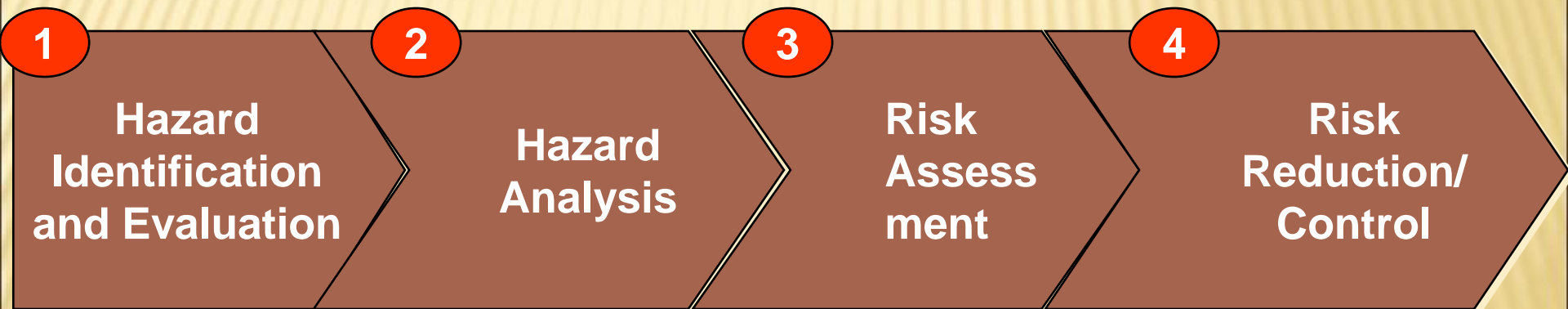
# FUNDAMENTALS: *HAZARD* *VERSUS RISK*

It is important to understand the difference between a hazard and a risk.

- ✘ A ***hazard*** is an inherent biological, chemical, or physical characteristic of a material, system, process, or plant that has the potential for causing harm.
- ✘ ***Risk*** is the measure of potential human injury, economic loss, or environmental impact in terms of its severity and likelihood.

# FUNDAMENTALS: *RISK MANAGEMENT PROCESS*

There are four activities that can be part of an effective risk management process.



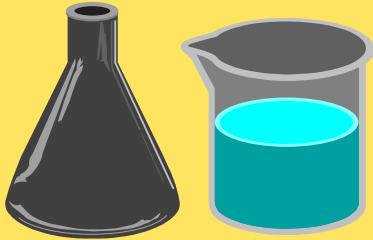
Each of these will be discussed in more detail in the sections that follow.



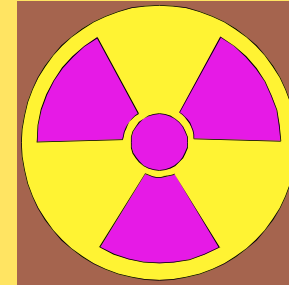
# HAZARD IDENTIFICATION

The first step in a risk management process is to make an inventory of the hazards at the site.

## Chemical



## Physical

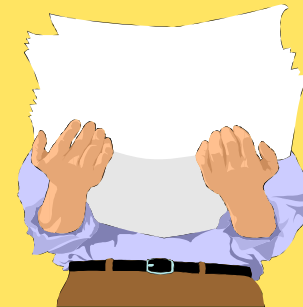


Types of  
Hazards

## Biological



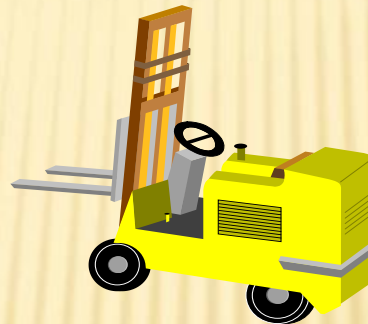
## Ergonomic



# HAZARD IDENTIFICATION: *SOURCES OF HAZARDS*

Hazards can be produced or can arise from many sources within the workplace.

- ✗ Materials
- ✗ Machinery
- ✗ Equipment
- ✗ Tools
- ✗ Processes
- ✗ Physical layout of the workstation
- ✗ Human interface



# HAZARD IDENTIFICATION: *EVALUATION OF HAZARDS*

When developing the inventory, the following items should be considered for the hazards:

- ✗ The level of exposure
- ✗ The duration of exposure
- ✗ The potential for, and effect of, simultaneous exposures
- ✗ The current controls in place



# HAZARD IDENTIFICATION: *METHODS*

There are several tools **that** can be used to identify and evaluate hazards in the workplace.

## Qualitative

- Walkthroughs
- Reviews of:
  - Accident reports
  - Audit/inspection reports
  - MSDSs
  - Procedures
- Interviews with workers and supervisors

## Quantitative

- Analysis of accident/injury statistics and trends
- Survey measurements
- Exposure monitoring



# HAZARD IDENTIFICATION: *EXERCISE*

## Hazard Identification Exercise

- ✘ Break into small groups.
- ✘ Brainstorm a list of hazards found at your facility.
- ✘ Try to identify examples of chemical, physical, biological, and ergonomic hazards.
- ✘ Include at least 3 different hazards - the results will be used for a second exercise later.

# HAZARD ANALYSIS

*Hazard analysis* techniques can be used to ensure that hazard identification and evaluation is complete.

**A *hazard analysis* is a structured, systematic examination of the hazards of a process or task that helps:**

1. Uncover hazards that may have been overlooked.
2. Identify hazards that developed after a process or task was instituted.
3. Identify hazards that developed after a process or task was modified.

# HAZARD ANALYSIS: *METHODS*

Formal methods for hazard analysis include inductive and deductive techniques.

## Inductive

- Failure Modes and Effects Analysis (FMEA)
- Hazard and Operability Study (HAZOP)
- Job Hazard Analysis (JHA)


## Deductive


- Event Tree Analysis
- Fault Tree Analysis


*The **job hazard analysis** is the most widely used hazard analysis technique and will be discussed in more detail.*

# RISK ASSESSMENT

Once hazards are identified, they should be ranked. Ranking should be based on:

 Hazard consequence or severity

 Hazard probability or likelihood

 Exposure group

**Typically:**  
**Risk = Severity x Likelihood**



# RISK ASSESSMENT: *HAZARD* *CONSEQUENCE*

Hazard consequence is related to the seriousness and severity of the outcome.

**Catastrophic**

**May cause permanent disability or loss of life**

**Critical**

**May cause severe injury or illness with lost time**

**Marginal**

**May cause minor injury/illness**

**Negligible**

**Violates program/standard, but probably would not result in an injury/illness**

# RISK ASSESSMENT: *HAZARD PROBABILITY*

Hazard probability deals with the likelihood of occurrence.

**High**

**Likely to occur immediately or within a short period of time**

**Medium**

**Probably will occur**

**Low**





**Possibly will occur**

**Very Low**

**Unlikely to occur**

# RISK ASSESSMENT: *EXPOSURE*

In setting priorities, it is also important to know how many people may be exposed.

-  Greater than 50 persons regularly exposed
-  Between 10 and 49 persons regularly exposed
-  Between 5 and 9 persons regularly exposed
-  Fewer than 5 persons regularly exposed

***These are just example criteria. For each element (i.e., consequence, probability, exposure), criteria can be qualitative or quantitative.***

# RISK ASSESSMENT: *RISK ASSESSMENT MATRIX*

A risk assessment matrix combines these ratings to help you prioritize the hazards.

## Consequence

		Negligible	Marginal	Critical	Catastrophic
Probability	High	C	B	A	A
	Moderate	C	B	B	A
	Low	D	C	B	B
	Very Low	D	D	C	C



# RISK ASSESSMENT: *EXERCISE*

## Risk Assessment Exercise

- ✘ Break into small groups.
- ✘ Using the list of hazards developed from the last exercise, determine the potential severity of each hazard.
- ✘ Determine the likelihood that each hazard will result in an adverse consequence.
- ✘ Rank the hazards using a matrix similar to the one found on Overhead 15 (or a comparable rating scheme)
- ✘ Develop a prioritized list for action.

# RISK REDUCTION

There are three main types of controls or risk reduction methods.

## Engineering Controls



## Administrative Controls



## Personal Protective Equipment



# RISK REDUCTION: *ENGINEERING* CONTROLS

Engineering controls remove or isolate the hazard.

- ✗ Design and redesign
- ✗ Substitution
- ✗ Isolation
- ✗ Enclosure
- ✗ Ventilation

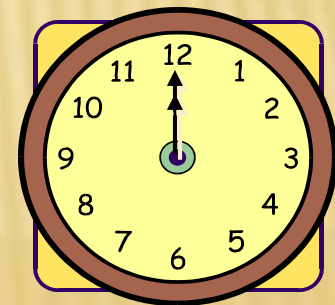
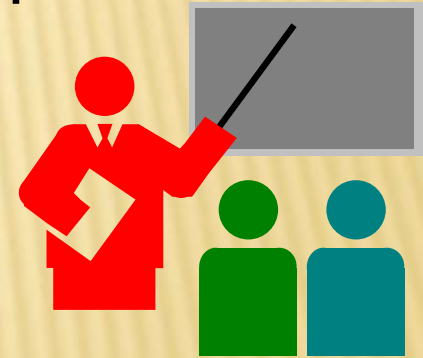
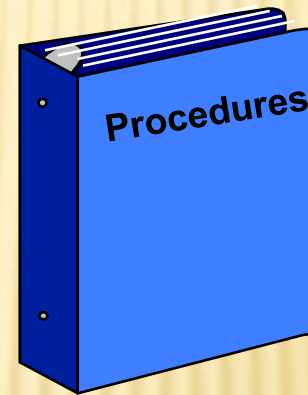




# RISK REDUCTION: ADMINISTRATIVE CONTROLS

Administrative controls include the work rules and procedures that help minimize exposures.

- ✗ Written programs
- ✗ Standard operating procedures
- ✗ Training
- ✗ Limited exposure time
- ✗ Job rotation
- ✗ Medical surveillance

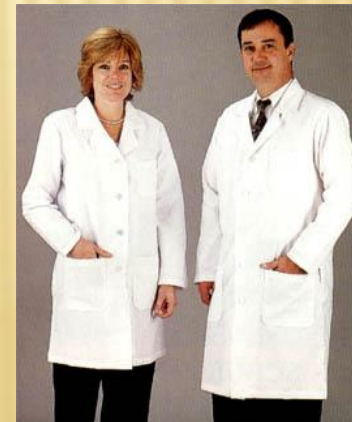




# RISK REDUCTION: *PERSONAL PROTECTIVE EQUIPMENT*

PPE provides a physical barrier between the hazard and the employee.

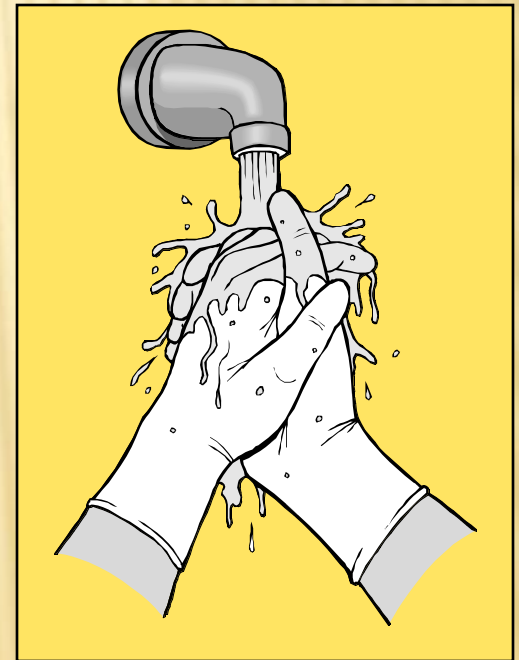
- ✘ Eye and face protection
- ✘ Hearing protection
- ✘ Hand and body protection
- ✘ Head protection
- ✘ Respiratory protection



# RISK REDUCTION: *OTHER CONTROLS*

Other risk reduction methods include:

- ✗ Good housekeeping
- ✗ Preventive maintenance
- ✗ Continuous monitoring devices and alarms
- ✗ Personal hygiene



# JOB HAZARD ANALYSIS

A Job Hazard Analysis (JHA) is a widely used tool to evaluate hazards in the workplace.

## **Definition**

A JHA is a systematic process to identify the hazards associated with a job or task that may not be readily apparent.

## **Purpose**

The intent of a JHA is to make a job safer by identifying potential hazards and effectively eliminating or controlling them.



# JOB HAZARD ANALYSIS: *BENEFITS*

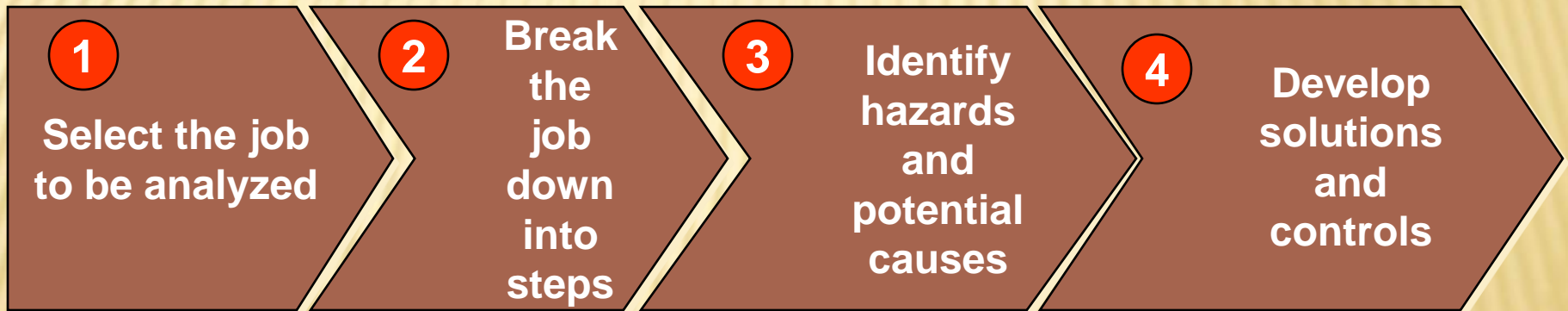
The effort involved in completing a JHA is more than compensated for by the benefits.

- ✖ Improved and standardized job procedures
- ✖ Decreased lost-time accidents
  - ✚ Reduced workers' compensation costs
  - ✚ Reduced absenteeism
  - ✚ Improved productivity
- ✖ Improved safety attitude and morale
- ✖ Employee involvement in the safety program
- ✖ On-the-job training for supervisors and employees

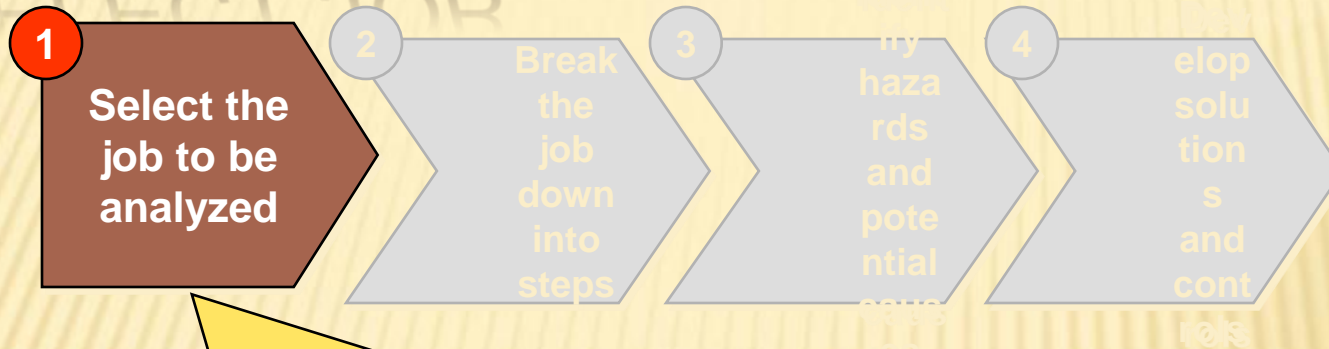


# JOB HAZARD ANALYSIS: *BASIC STEPS*

A JHA has four basic steps:



# JOB HAZARD ANALYSIS: *SELECT JOB*

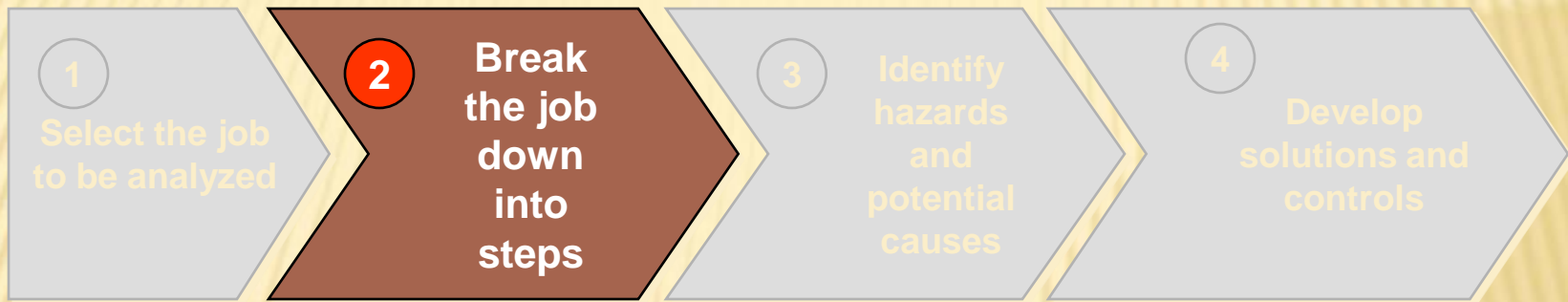


Consider:

- **Frequency** of accidents/injuries and “near misses”
- Rate of **disabling injuries**
- The **severity** potential of the consequences
- **New or modified jobs**

**Jobs  
should not  
be  
selected at  
random!**

# JOB HAZARD ANALYSIS: *BREAK JOB INTO STEPS*

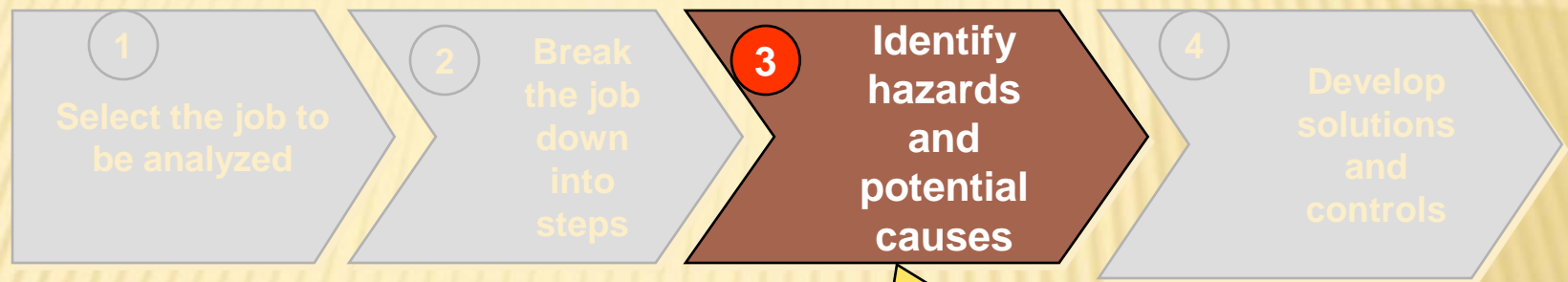


- **Select an employee** to observe.
- **Brief the employee** on the purpose and procedure of the JHA.
- **Observe the task** being performed.
- **Record each step** in the breakdown.
- **Check the breakdown** with the employee.



# JOB HAZARD ANALYSIS:

## *IDENTIFY HAZARDS*








- Use a structured line of questioning and brainstorming.
- Identify all existing and potential hazards for each step.
- For each step, record the type of accident and the potential causes.
- Check the list against the worker's experience in the job.

# JOB HAZARD ANALYSIS: *IDENTIFY HAZARDS-CHECKLIST*

Some of the questions that can be asked include:

## **Task and Environment Interaction with the Employee**





-  Can the employee be struck by, strike against, or come in contact with anything?
-  Can the employee be caught in, on, or between anything?
-  Can the employee slip, trip, or fall?
-  Can the employee be overexerted (e.g., from pulling, lifting, bending)?
-  Can the employee be exposed to anything injurious (e.g., chemicals, physical hazards, biologicals)?

# JOB HAZARD ANALYSIS:

## *IDENTIFY HAZARDS-CHECKLIST*

Some of the questions that can be asked include:

### Employee Interaction with the Job Step

-  In what ways can the employee's implementation of job steps present hazards (i.e., ***sequence***)?
-  In what ways can the ***timing*** of the step present hazards?
-  In what ways can the employee's ***use of materials*** present hazards?
-  In what ways can other ***deviations*** of expected actions and assumptions present hazards?










# JOB HAZARD ANALYSIS:

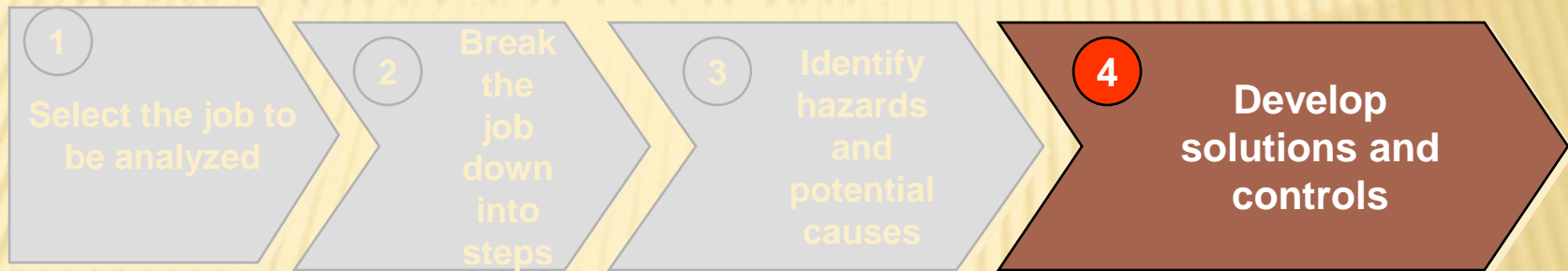
## *IDENTIFY HAZARDS-CHECKLIST*

Some of the questions that can be asked include:

### **Current Controls In Place**

-  What types of engineering controls are in place?
-  Has the worker been trained in the procedure?
-  Is the worker wearing PPE? Does it fit properly?
-  Has the worker been trained in the proper use of PPE?
-  Is adequate machine guarding in place?
-  Are lockout/tagout procedures used?
-  Is housekeeping adequate?

# JOB HAZARD ANALYSIS: DEVELOP SOLUTIONS



- Document that existing control measures are adequate **OR**:
  - Modify the job procedure.
  - Change the conditions that create the hazards.
  - Decrease the frequency.
- Check recommendations with workers performing the job.

# Job Hazard Analysis: Sample JHA

Sequence of Basic Job Steps	Potential Hazards	Recommendation Action of Procedures
1. Pick finished box from stock	•Struck hand on wheel •Wheel explodes	•Place box on side of wheel away from sharp corner
2. Grasp casting and position	•Strike hand on wheel by lifting casting from box •Drop casting on foot during positioning	•Place box on work stand so operator doesn't have to bend •Require wearing safety shoes
3. Push casting against wheel and grind burn	•Strike hand on wheel •Wheel explodes •Flying sparks/cuts •Respirable dust hazard •Sleeves caught in machinery	•Assure correct guard and wheel install •Check RPM rating on wheel •Require wearing of eye goggles •Provide local exhaust system •No long sleeve shirts during this operation
4. Place finished casting in box	•Strike hand on parts in box	•Remove competed stock routinely



# JOB HAZARD ANALYSIS: *EXERCISE*

- ✖ Break into small groups.
- ✖ Turn to the JHA Exercise in your manual. Read through the description of the activity (see next slide)
- ✖ Complete the JHA activity based on the job of mowing the lawn. Use three columns: 1) Sequence/Job Step, 2) Potential Hazard, and 3) Recommended Corrective Action
- ✖ Use your existing knowledge of how to mow a lawn to identify the steps and the hazards involved.
- ✖ Record your team's JHA on a flip chart.

# JOB HAZARD ANALYSIS: *EXERCISE*

## JHA: Lawn Mowing

- ✖ Several minor injuries and property damage have occurred during the performance of grass cutting activities. Management would like a JHA performed on this procedure.
- ✖ Incident history for lawn-keeping activities:
  - ⚡ Broken cafeteria window due to a stone thrown from the mower.
  - ⚡ Minor cut to index finger from rotating blade while removing wet grass from discharge chute.
  - ⚡ Passerby hit by thrown debris.
  - ⚡ Eye irritation from foreign material ejected from mower.



## Job Hazard Analysis Form

JOB/TASK NAME: <div style="text-align: center;">Grass Mowing</div>		PAGE ____ OF ____	DATE:	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED
EMPLOYEE(S) POSITION(S) PERFORMING THE JOB Lawn Service		SUPERVISOR(S): Joe Cutting	ANALYSIS BY: R. U. Safe	
COMPANY NAME: Lawn Service Company	PLANT/LOCATION: Wichita	DEPARTMENT(S):	REVIEWED BY: Will B. Safe	
PERSONAL PROTECTIVE EQUIPMENT: Safety Glasses, Safety Shoes, Hearing Protection, Leather Gloves		SHIFT (if applicable):	APPROVED BY: A.M. Safe	

JOB STEPS	POTENTIAL HAZARDS	ACTION/PROCEDURE TO CONTROL OR ELIMINATE
1	<b>Pre Use Inspection</b>	Laceration, Strains, Foreign Body Eye  Wear Safety Glasses, Leather gloves, use two people to turn mover to inspect blades
2	<b>Servicing Mower</b>	Fire, Chemical splash/Spill  Use funnel when adding gasoline, bond container to mower. Wear Safety glasses to prevent splash in eyes. Never fuel a hot engine. Do not Smoke when fueling.
3	<b>Starting Mower</b>	Strain, Foot injury  Don PPE Eye wear, Hearing Protection, glove, and Safety Shoes. Push 3 times on primer button Choke the engine Be sure feet are not under or near mower deck. Pull retractable starting cord briskly.
4	<b>Mower Grass</b>	Dehydration, Flying Debris, Foot injury, eye injury, and hearing loss.  Drink plenty of fluids. Warn other persons in area of flying debris. Assure exit shield is in place. Do not mow over objects laying on the ground. Always push mower away from you do no pull toward you.



# JOB HAZARD ANALYSIS: *REVISING THE JHA*

JHAs are only effective if they are reviewed and updated periodically.

